

CLAIMS

I CLAIM:

- 5 1. A multi-pole high speed generator, comprising:
 an exciter including a plurality of exciter armature windings wound
 thereon; and
 one or more rectifier module assemblies each coupled to receive an AC
 signal generated in one of the plurality of exciter armature windings, each rectifier
 10 module comprising:
 a substantially flat base including a plurality of conductive circuit
 runs on a surface thereof, the base being dimensioned to mount within the
 exciter;
 a first diode circuit, including an anode and a cathode, having the
 15 anode electrically coupled to at least a first of said plurality conductive
 circuit runs;
 a second diode circuit, including an anode and a cathode, having its
 cathode electrically coupled to at least a second of said plurality of
 conductive circuit runs; and
 20 a conductive element electrically coupling together the cathode of
 said first diode circuit and the anode of said second diode circuit.
- 25 2. The generator of Claim 1, further comprising:
 a resistive element electrically coupled between said first and second
 conductive circuit runs.
- 30 3. The generator of Claim 2, wherein said resistive element comprises
 a thin-film resistor.

4. The generator of Claim 1, further comprising:
an AC input terminal electrically coupled to at least a third of said plurality
of conductive circuit runs and to said conductive element.

5 5. The generator of Claim 4, wherein said AC input terminal is
configured to receive a connector for electrically coupling the rectifier module
assembly to one of the plurality of exciter armature windings.

6. The generator of Claim 1, further comprising:
10 first and second DC output terminals electrically coupled to said first and
said second conductive circuit runs, respectively.

7. The generator of Claim 6, wherein said first and second DC output
terminals are each configured to electrically couple the rectifier module assembly
15 to a field winding in the multi-pole high speed generator.

8. The generator of Claim 1, wherein said first and second diode
circuits each comprise a plurality of individual diodes electrically connected in
parallel with one another.
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9. The generator of Claim 8, wherein the plurality of individual
diodes comprises five diodes electrically connected in parallel with one another.

10. The generator of Claim 1, wherein said first and second diode
25 circuits are coupled to said first and second conductive circuit runs, respectively,
by a brazing process.

11. The generator of Claim 1, wherein said conductive
element is coupled to said first and second diodes by a brazing process.
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12. The generator of Claim 1, further comprising:
a non-conductive substrate interposed between said substantially flat base
and said plurality of conductive circuit runs.

5 13. The generator of Claim 12, wherein said non-conductive substrate
comprises ceramic.

14. The generator of Claim 1, wherein said substantially flat base
comprises a metallic material.

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15. The generator of Claim 1, wherein said plurality of
conductive circuit runs each comprise copper.

16. The generator of Claim 1, wherein said first and
15 second diode circuits each comprise glass encapsulated diodes.

17. The generator of Claim 1, wherein said base is dimensioned to
mount axially within said exciter.

20 18. A rectifier module assembly for rectifying one phase of a multi-
phase AC signal generated in a plurality of exciter armature windings wound on
an exciter of a multi-pole high speed generator, comprising:

a substantially flat base including a plurality of conductive circuit runs on
a surface thereof, the base being dimensioned to mount within the exciter;

25 a first diode circuit, including an anode and a cathode, having the anode
electrically coupled to at least a first of said plurality conductive circuit runs;

a second diode circuit, including an anode and a cathode, having its
cathode electrically coupled to at least a second of said plurality of conductive
circuit runs; and

a conductive element electrically coupling together the cathode of said first diode circuit and the anode of said second diode circuit.

5 19. The rectifier module assembly of Claim 18, further comprising:
a resistive element electrically coupled between said first and second
conductive circuit runs.

10 20. The rectifier module assembly of Claim 19, wherein said resistive
element comprises a thin-film resistor.

 21. The rectifier module assembly of Claim 18, further comprising:
an AC input terminal electrically coupled to at least a third of said plurality
of conductive circuit runs and to said conductive element.

15 22. The rectifier module assembly of Claim 21, wherein said AC input
terminal is configured to receive a connector for electrically coupling the rectifier
module assembly to one of the plurality of exciter armature windings.

20 23. The rectifier module assembly of Claim 18, further comprising:
first and second DC output terminals electrically coupled to said first and
said second conductive circuit runs, respectively.

25 24. The rectifier module assembly of Claim 23, wherein said first and
second DC output terminals are each configured to electrically couple the rectifier
module assembly to a field winding in the multi-pole high speed generator.

 25. The rectifier module assembly of Claim 18, wherein said first and
second diode circuits each comprise a plurality of individual diodes electrically
connected in parallel with one another.

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26. The rectifier module assembly of Claim 25, wherein the plurality of individual diodes comprises five diodes electrically connected in parallel with one another.

5 27. The rectifier module assembly of Claim 18, wherein said first and second diode circuits are coupled to said first and second conductive circuit runs, respectively, by a brazing process.

10 28. The rectifier module assembly of Claim 18, wherein said conductive element is coupled to said first and second diodes by a brazing process.

15 29. The rectifier module assembly of Claim 18, further comprising:
a non-conductive substrate interposed between said substantially flat base and said plurality of conductive circuit runs.

30. The rectifier module assembly of Claim 29, wherein said non-conductive substrate comprises ceramic.

20 31. The rectifier module assembly of Claim 18, wherein said substantially flat base comprises a metallic material.

25 32. The rectifier module assembly of Claim 18, wherein said plurality of conductive circuit runs each comprise copper.

33. The rectifier module assembly of Claim 18, wherein said first and second diode circuits each comprise glass encapsulated diodes.

30 34. The rectifier module assembly of Claim 18, wherein said base is dimensioned to mount axially within the exciter.

35. A rectifier module assembly for rectifying one phase of a multi-phase AC signal generated in a plurality of exciter armature windings of a multi-pole high speed generator, comprising:

5 a substantially flat base including a plurality of conductive circuit runs formed on a surface thereof;

a first diode circuit, including an anode and a cathode, having the anode electrically coupled to at least a first of said plurality conductive circuit runs;

10 a second diode circuit, including an anode and a cathode, having the cathode electrically coupled to at least a second of said plurality of conductive circuit runs;

a resistive element electrically coupled between said first and said second conductive circuit runs; and

15 a conductive element electrically coupling together the cathode of said first diode circuit and the anode of said second diode circuit.

36. The rectifier module assembly of Claim 35, wherein said resistive element comprises a thin-film resistor.

20 37. The rectifier module assembly of Claim 35, further comprising:
an AC input terminal electrically coupled to at least a third of said plurality of conductive circuit runs and to said conductive element.

25 38. The rectifier module assembly of Claim 37, wherein said AC input terminal is configured to receive a connector for electrically coupling the rectifier module assembly to one of the plurality of exciter armature windings.

39. The rectifier module assembly of Claim 35, further comprising:

first and second DC output terminals electrically coupled to said first and said second conductive circuit runs, respectively.

5 40. The rectifier module assembly of Claim 39, wherein said first and second DC output terminals are each configured to electrically couple the rectifier module assembly to a field winding in the multi-pole high speed generator.

10 41. The rectifier module assembly of Claim 35, wherein said first and second diode circuits each comprise a plurality of individual diodes electrically connected in parallel with one another.

15 42. The rectifier module assembly of Claim 41, wherein the plurality of individual diodes comprises five diodes electrically connected in parallel with one another.

20 43. The rectifier module assembly of Claim 35, wherein said first and second diode circuits are coupled to said first and second conductive circuit runs, respectively, by a brazing process.

25 44. The rectifier module assembly of Claim 35, wherein said conductive element is coupled to said first and second diodes by a brazing process.

30 45. The rectifier module assembly of Claim 35, further comprising:
a non-conductive substrate interposed between said substantially flat base and said plurality of conductive circuit runs.

 46. The rectifier module assembly of Claim 45, wherein said non-conductive substrate comprises ceramic.

47. The rectifier module assembly of Claim 35, wherein said substantially flat base comprises a metallic material.

5 48. The rectifier module assembly of Claim 35, wherein said plurality of circuit runs each comprise copper.

49. The rectifier module assembly of Claim 35, wherein said first and second diode circuits comprise glass encapsulated diodes.

10 50. A rectifier module assembly for mounting within a hub of an exciter of a multi-pole high speed generator, comprising:

a substantially flat base including at least a first, a second, and a third conductive circuit run on a surface thereof;

15 a first DC output terminal electrically coupled to at least said first conductive circuit run;

a second DC output terminal electrically coupled to at least said second conductive circuit run;

an AC input terminal electrically coupled to at least said third conductive circuit run;

20 a first plurality of parallel-connected diodes, each including an anode and a cathode, and each having its anode electrically coupled to at least said first conductive circuit run;

25 a second plurality of parallel-connected diodes, each including an anode and a cathode, and each having its cathode electrically coupled to at least said second conductive circuit run;

a thin-film resistive element electrically coupled between said first and said second conductive circuit runs; and

30 a conductive element electrically coupling together the cathodes of said first plurality of parallel-connected diodes, the anodes of said second plurality of parallel-connected diodes, and said AC input terminal.

51. The rectifier module assembly of Claim 50, wherein said plurality of first and second parallel-connected diodes each comprise five individual diodes.

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52. The rectifier module assembly of Claim 50, further comprising: a non-conductive substrate interposed between said substantially flat base and said first, second, and third conductive circuit runs.

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53. The rectifier module assembly of Claim 52, wherein said non-conductive substrate comprises ceramic.

54. The rectifier module assembly of Claim 50, wherein said AC input terminal is configured to receive a connector for coupling the rectifier module assembly to a high speed generator exciter armature winding.

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55. The rectifier module assembly of Claim 50, wherein said first and second DC terminals are each configured to couple the rectifier module assembly to a high speed generator field winding.

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56. The rectifier module assembly of Claim 50, wherein said base comprises a metallic material.

57. The rectifier module assembly of Claim 50, wherein of said first, second, and third conductive runs, and said conductive element, each comprise copper.

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58. A rectifier circuit for rectifying a multi-phase AC signal generated in a plurality of exciter armature windings of a multi-pole high speed generator

and providing a DC signal to a field winding of the generator, the rectifier circuit comprising:

a plurality of parallel-connected rectification circuits each including (i) an AC input terminal for receiving one phase of the multi-phase AC signal and (ii)
5 first and second DC output terminals for providing the DC signal to the field winding, wherein each of said plurality of rectification circuits comprises:

a first diode circuit having its anode electrically coupled to said AC input terminal and its cathode electrically coupled to said first DC output terminal;

10 a second diode circuit having its cathode electrically coupled to said AC input terminal and its anode electrically coupled to said second DC output terminal; and

a resistive element electrically coupled between said first and second DC output terminals.

15 59. The rectifier circuit of Claim 58, wherein said first and second diode circuits each comprise a plurality of individual diodes electrically connected in parallel with one another.

20 60. The rectifier circuit of Claim 59, wherein the plurality of individual diodes comprises five individual diodes electrically connected in parallel with one another.

25 61. The rectifier circuit of Claim 58, wherein said resistive element comprises a thin-film resistive element.

30 62. The rectifier circuit of Claim 58, wherein each of said plurality of rectification circuits is formed on a substantially flat base dimensioned to mount axially within a hub onto which the plurality of exciter armature windings are mounted.

63. The rectifier circuit of Claim 62, wherein each of said plurality of rectification circuits is mounted within the hub, and spaced equidistant from a center of the hub and equidistant around a circumference thereof.

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64. A modular rectifier circuit for rectifying one phase of a multi-phase AC signal generated in a plurality of exciter armature windings wound on an exciter hub of a multi-pole high speed generator, comprising:

10 a substantially flat base having mounted thereon components that comprise the rectifier circuit, said base being dimensioned to removably mount within the exciter hub; and

a plurality of terminals mechanically coupled to said base, each of said plurality of terminals being configured to receive a fastener.

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65. The modular rectifier circuit of Claim 64, wherein said plurality of terminals includes an AC input terminal, and first and second DC output terminals.

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66. The modular rectifier circuit of Claim 65, wherein said AC input terminal includes an open-ended slot for receiving a fastener therein.

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67. The modular rectifier circuit of Claim 65, wherein said first and second DC output terminals each include openings for receiving a fastener therein.